A plane flying horizontally at an altitude of 1 mile above land and speed of 500 miles per hour passes directly over a radar station. Find the rate at which the distance from the plane to the station is increasing when it is 2 miles away from the station. Show all your work.

\[
x = 1 \\
dx \quad \frac{dt}{dt} = 0 \\
y = 2 \\
dy \quad \frac{dt}{dt} = 500 \\
h = \sqrt{1^2 + 2^2} = \sqrt{5} \\
dh \quad \frac{dt}{dt} = ?
\]

\[
x^2 + y^2 = h^2 \\
2x \frac{dx}{dt} + 2y \frac{dy}{dt} = 2h \frac{dh}{dt} \\
x \frac{dx}{dt} + y \frac{dy}{dt} = h \frac{dh}{dt} \\
0 + 2 \cdot 500 = \sqrt{5} \frac{dh}{dt} \\
\frac{dh}{dt} = 2 \cdot 500 = \frac{1000}{\sqrt{5}}
\]

Instructor’s note: Could this problem be interpreted to mean that \( h = 2 \), not \( y = 2 \)? Maybe. I wouldn’t take off points if that’s how you interpreted it.